THE third number of the new Italian Geological Journal, or *Bollettino*, published by the "Comitato Geologico d'Italia," opens with M. Igino Cocchi's paper on the stratified rocks of the isle of Elba. It especially relates to the lower secondary, eocene, cretaceous, and post pliocene strata, and is illustrated with engravings. Among the bibliographical notices, Professor Omboni's work on the Geology of Italy, with eight maps, is well spoken of. The number also comprises translations of extracts from foreign memoirs.

THE *American Naturalist*, Vol, IV., No. 2, April 1870.—The April number of this Journal contains three exceedingly interesting articles, namely, a report on the Sea Otters of the north-west coast of America and Aleutian islands, by Captain C. M. Scammon; a paper on Parasitic Insects, from the able hand of Dr. A. S. Packard; and some notes on the Fresh-water Fish of New Jersey, by Dr. C. C. Abbott, which contains many valuable remarks. The last two papers are illustrated.—Dr. W. Wood contributes a popular article on Falconry.—The usual reviews and short miscellaneous notices complete the contents of the number.

SOCIETIES AND ACADEMIES

LONDON

Royal Society.—April 28.—"On the Organs of Vision in the Common Mole." By Robert James Lee.

"On an Aplanatic Searcher, and its Effects in improving High Power Definition in the Microscope." By G. W. Royston-Pigott, M.A., M.D.

The Aplanatic Searcher is intended to improve the penetration, amplify magnifying power, intensify definition, and raise the objective somewhat further from its dangerous proximity to the delicate covering-glass indispensable to the observation of objects under very high powers. The inquiry into the practicability of improving the performance of microscopic object-glasses of the very finest known quality was suggested by an accidental resolution in 1862 of the Podura markings into black beads. This led to a search for the cause of defective definition, if any existed. A variety of first-class objectives, from the $\frac{1}{16}$ to the $\frac{1}{4}$, failed to show the beading, although most carefully constructed by Messrs. Powell and Lealand. Experiments having been instituted on the nature of the errors, it was found that the instrument required a better distribution of power; instead of depending upon the deepest eyepieces and most powerful objectives hitherto constructed, that better effects could be produced by regulating a more gradual bending or refraction of the excentrical rays emanating from a brilliant microscopic origin of light. It then appeared that delusive images, which the writer has ventured to name *eidola* , exist in close proximity to the best focal point (where the least circle of confusion finds its focus).

I. That these images, possessing extraordinary characters, exist principally above or below the best focal point, according as the objective spherical aberration is positive or negative.

II. That test-images may be formed of a high order of delicacy and accurate portraiture in *miniature*, by employing an objective of twice the focal depth, or, rather, half the focal length, of the observing objective.

III. That such test-images (which may be obtained conveniently two thousand times less than a known original) are formed (under precautions) with a remarkable freedom from aberration, which appears to be reduced in the miniature to a *minimum*.

IV. The beauty or indistinctness with which they are displayed (especially on the immersion system) is a marvellous test of the correction of the observing objective, but an indifferent one of the image-forming objective used to produce the testing miniature.

These results enable the observer to compare the known with the unknown. By observing a variety of brilliant images of known objects, as gauze, lace, an ivory thermometer, and sparkles of mercury, all formed in the focus of the objective to be tested with the microscope properly adjusted so that the axes of the two objectives may be coincident, and their corrections suitably manipulated, it is practicable to compare known delusions with suspected phenomena.

It was then observed (by means of such appliances) that the aberration developed by high-power eyepieces and a lengthened tube followed a peculiar law.

A. A lengthened tube increased aberration faster than it gained power (roughly, the aberration varied as v^2, while the power varied as v).

B. As the image was formed by the objective at points nearer to it than the *standard distance of nine inches*, for which the best English glasses are corrected, the writer found the aberration diminished faster than the power was lost, by shortening the body of the instrument.

C. The aberration became negatively affected, and required a positive compensation.

D. Frequent consideration of the equations for aplanatism suggested the idea of searching the axis of the instrument for aplanatic foci, and that many such foci would probably be found to exist in proportion to the number of terms in the equations (involving curvatures and positions).

E. The law was then ascertained that power could be raised, and definition intensified, by positively correcting the searching lenses in proportion as they approached the objective, at the same time applying a similar correction to the observing objective.

The chief results hitherto obtained may be thus summarised. The writer measured the distance gained by the aplanatic searcher, whilst observing with a half-inch objective with a power of seven hundred diameters, and found it *two-tenths of an inch increase;* so that optical penetration was attainable with this high power through plate-glass nearly one quarter of an inch thick, whilst *visual* focal depth was proportionably increased. The aplanatic searcher increases the power of the microscope from two and a half to five times the usual power obtained with a third or C eye-piece of one inch focal length. The eighth thus acquires the power of a twenty-fifth, the penetration of a one-fourth. And at the same time the lowest possible eyepiece (3-inch focus) is substituted for the deep eye-piece formed of minute lenses, and guarded with a minutely perforated cap. The writer lately exhibited to Messrs. Powell and Lealand a brilliant definition, under a power of four thousand diameters, with their new "eighth immersion" lens, by means of the searcher and low eyepiece.

The traverse of the aplanatic searcher introduces remarkable chromatic corrections displayed in the unexpected colouring developed in microscopic test objects. The singular properties, or rather phenomena, shown by eidola, enable the practised observer in many cases to distinguish between true and delusive appearances, especially when aided by the aberrameter applied to the objective to display excentrical aberration by cutting off excentrical rays. Eidola are symmetrically placed on each side of the best focal point, as ascertained by the aberrameter when the compensations have attained a delicate balance of opposite corrections.

If the beading, for instance, of a test object exists in two contiguous parallel planes, the eidolon of one set is commingled with the true image of the other. But the upper or lower set may be separately displayed, either by depressing the false eidola of the lower stratum, or elevating the eidola of the upper. For when the eidola of two contiguous strata are intermingled, correct definition is impossible so long as the aperture of the objective remains considerable.

One other result accrues: when an objective, otherwise excellent, cannot be further corrected, the component glasses being already closely screwed up together, a further correction can be applied by means of the adjustments of the aplanatic searcher itself, all of which are essentially conjugate with the actions of the objective and the variable positions of its component lenses; so that if δx be the traversing movements of the objective lenses, δv that of the searcher, F the focal distance of the image from the objective when δx vanishes, f the focal distance of the virtual image formed by the facet lenses of the objective, then

$$\frac{\delta v}{\delta x} = \left(\frac{F}{f_1}\right)^2$$

The *appendix* refers to plates illustrating the mechanical arrangements for the discrimination of eidola and true images, and for traversing the lenses of the aplanatic searcher. The plates also show the course of the optical pencils, spurious disks of residuary aberration and imperfect definition, as well as some examples of "high-power resolution" of the Podura and Lepisma beading, as well as the amount of amplification

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From εἴδωλον, a false spectral image.

obtained by Camera Lucida outline drawings of a given scale.

"On a Cause of Error in Electroscopic Experiments." By Sir Charles Wheatstone, F.R.S.

To arrive at accurate conclusions from the indications of an electroscope or electrometer, it is necessary to be aware of all the sources of error which may occasion these indications to be misinterpreted. In the course of some experiments on electrical conduction and induction which I have recently resumed, I was frequently delayed by what at first appeared to be very puzzling results. Occasionally I found that I could not discharge the electrometer with my finger, or only to a certain degree, and that it was necessary, before commencing another experiment, to place myself in communication with a gas-pipe which entered the room. How I became charged I could not at that time explain; the following chain of observations and experiments, however, soon led me to the true solution. I was sitting at a table not far from the fireplace, with the electrometer (one of Peltier's construction) before me, and was engaged in experimenting with disks of various substances. To ensure that the one I had in hand, which was of tortoise-shell, should be perfectly dry, I rose and held it for a minute before the fire; returning and placing it on the plate of the electrometer, I was surprised to find that it had apparently acquired a strong charge, deflecting the index of the electrometer beyond 90°. I found that the same thing took place with every disk I thus presented to the fire, whether of metal or any other substance. My first impression was that the disk had been rendered electrical by heat, though it would have been extraordinary that, if so, such a result had not been observed before; but on placing it in contact with a vessel of boiling water, or heating it by a gas-lamp, no such effect was produced. I next conjectured that the phenomenon might arise from a difference in the electrical state of the air in the room and at the top of the chimney; and to put this to the proof, I adjourned to the adjacent room where there was no fire, and bringing my disk to the fireplace I obtained precisely the same result. That this conjecture, however, was not tenable was soon evident, because I was able to produce the same deviation of the needle of the electrometer by bringing my disk near any part of the wall of the room. This seemed to indicate that different parts of the room were in different electrical states; but this again was disproved by finding that when the positions of the electrometer and the place where the disk was supposed to be charged were interchanged, the charge of the electrometer was still always negative. The last resource was to assume that my body had become charged by walking across the carpeted room, though the effect was produced even by the most careful treading. This ultimately proved to be the case; for resuming my seat at the table and scraping my foot on the rug, I was able at will to move the index to its greatest extent.

Before I proceed further I may state that a gold-leaf electrometer shows the phenomena as readily. When I first observed these effects the weather was frosty; but they present themselves, as I have subsequently found, almost equally well in all states of the weather, provided the room be perfectly dry. I will now proceed to state the conditions which are necessary for the complete success of the experiments, and the absence of which has prevented them from being hitherto observed in the striking manner in which they have appeared to me. The most essential condition appears to be that the boot or shoe of the experimenter must have a thin sole and be perfectly dry; a surface polished by wear seems to augment the effect. By rubbing the sole of the boot against the carpet or rug, the electricities are separated, the carpet assumes the positive state and the sole the negative state; the former being a tolerable insulator, prevents the positive electricity from running away to the earth, while the sole of the foot, being a much better conductor, readily allows the charge of negative electricity to pass into the body. So effective is the excitation, that if three persons hold each other by the hands, and the first rubs the carpet with his foot while the third touches the plate of the electrometer with his finger, a strong charge is communicated to the instrument. Even approaching the electrometer by the hand or body, it becomes charged by induction at some distance.

A stronger effect is produced on the index of the instrument if, after rubbing the foot against the carpet, it be immediately raised from it. When the two are in contact, the electricities are in some degree coerced or dissimulated; but when they are separated, the whole of the negative electricity becomes free and expands itself in the body. A single stamp on the carpet followed by an immediate removal of the foot causes the index of the electrometer to advance several degrees, and by a reiteration of such stamps the index advances 30° or 40°. The opposite electrical states of the carpet and the sole of the boot were thus shown: after rubbing, I removed the boot from the carpet, and placed on the latter a proof-plate (*i.e.* a small disk of metal with an insulating handle), and then transferred it to the plate of the electrometer: strong positive electricity was manifested. Performing the same operation with the sole of the boot, a very small charge was carried, by reason of its ready escape into the body. The negative charge assumed by sole-leather when rubbed with animal hair was thus rendered evident. I placed on the plate of the electrometer a disk of sole-leather and brushed it lightly with a thick camel's-hair pencil; a negative charge was communicated to the electrometer, which charge was principally one of conduction, on account of the very imperfect insulating power of the leather. Various materials, as India-rubber, gutta-percha, &c., were substituted for the sole of the boot; metal plates were also tried; all communicated negative electricity to the body. Woollen stockings are a great impediment to the transmission of electricity from the boot; when these experiments were made I wore cotton ones. When I substituted for the electrometer a long wire galvanometer, such as is usually employed in physiological experiments, the needle was made to advance several degrees.

At the meeting of the British Association at Dublin in 1857, Professor Loomis, of New York, attracted great attention by his account of some remarkable electrical phenomena observed in certain houses in that city. It appears that in unusually cold and dry winters, in rooms provided with thick carpets and heated by stoves or hot-air apparatus to 70°, electrical phenomena of great intensity are sometimes produced. A lady walking along a carpeted floor drew a spark one quarter of an inch in length between two metal balls, one attached to a gas-pipe, the other touched by her hand; she also fired ether, ignited a gaslight, charged a Leyden jar, and repelled and attracted pith-balls similarly or dissimilarly electrified. Some of these statement were received with great incredulity at the time both here and abroad, but they have since been abundantly confirmed by the Professor himself and by others. (See Silliman's American Journal of Science, July 1858.)

My experiments show that these phenomena are exceptional only in degree. The striking effects observed by Professor Loomis were feeble unless the thermometer was below the freezing-point, and most energetic when near zero, the thermometer in the room standing at 70°. Those observed by myself succeed in almost any weather, when all the necessary conditions are fulfilled. Some of these conditions must frequently be present, and experimentalists cannot be too much on their guard against the occurrence of these abnormal effects. I think I have done a service to them, especially to those engaged in the delicate investigations of animal electricity, by drawing their attention to the subject.

Royal Institution, May 2. Annual meeting.—Sir Henry Holland, Bart, M.D., D.C.L., F.R.S., President, in the chair. The annual report of the Committee of Visitors for the year 1869 was read and adopted. The books and pamphlets presented in 1869 amounted to 255 volumes, making, with those purchased by the managers, a total of 388 volumes added to the library in the year, exclusive of periodicals. Forty-seven new members were elected in 1869. Sixty-three lectures and nineteen evening discourses were delivered during the year 1869. The following gentlemen were unanimously elected as officers for the ensuing year:—President: Sir Henry Holland, Bart., M.D., D.C.L., F.R.S. Treasurer: William Spottiswoode, M.A., F.R.S. Secretary: Henry Bence Jones, M.A., M.D., F.R.S.

Royal Geographical Society, April 25.—Sir R. I. Murchison, Bart., President, in the chair. The following new Fellows were elected:—Baron Osten Sacken, Secretary to the Imperial Geographical Society, St. Petersburg (Hon. Corresponding Member); Thomas M. Blackie; Lieutenant Evelyn Baring, R.A.; Colonel Shuckburgh Denniss; George B. Hudson; Lord Lawrence, G.C.B.; and John Fenton Taylor.

A paper was read, entitled "An Expedition to the Trans-Narym Country," by Baron Osten Sacken. This paper, which had been translated from the Russian by Mr. Delmar Morgan, contained a narrative of a journey, undertaken for the purpose of a reconnaissance survey, by General Poltoratsky, across the

Thian-Shan Mountains to the vicinity of Kashgar. This territory became part of the Russian dominions by the treaty of Pekin in 1860, by which the frontier line was fixed as extending from the east of Lake Issyk-Kul, along the southern spur of the Celestial Mountains, to the Khokand country; but the territory had never yet been visited by a European. Starting from Fort Vernoë, north of Lake Issyk-Kul, the party turned the western end of the lake, and then marched nearly due south. The country was very mountainous and picturesque, five distinct lines of elevation belonging to the Thian-Shan system being crossed in succession, some of them by passes upwards of 12,000 feet in height. The intervening valleys are traversed by streams, forming the head-waters of the Jaxartes, the largest of which is the Narym; and on the elevated ridges lie two beautiful alpine lakes, the Sou-Kul and the Chatir-Kul. Game is very abundant along the banks of the rivers, and the country is but thinly peopled by tribes of Kirghizes. The Russians did not gain possession of the new territory without a severe struggle with the forces of the neighbouring independent state of Khokand, who, in October 1860, marched an army of 40,000 men against the small Russian force, but were defeated. Baron Osten Sacken paid great attention to the botany of the country passed through, and noted the various zones of vegetation, from the wooded lower slopes of the Thian-Shan to the treeless plains below the snow-line. The alpine flora he described as extremely rich and beautiful in colour and form—amongst the plants he mentioned *Anemone narcissiflora*, Ranunculi, Geraniums, Potentillas, Gentians, and other genera—showing a great resemblance between the productions of the Thian-Shan and the Himalaya. The expedition reached to within two marches of Kashgar, and then returned to Fort Vernoë.

A second paper, on "Recent Russian Explorations in Turkistan," was read by Mr. Delmar Morgan. In the discussion which followed, M. Bartholomei, of the Russian Legation, spoke of the friendly rivalry which now prevailed between Russians and English in the exploration of Central Asia. Sir Henry Rawlinson enumerated three new expeditions to different parts of Turkistan, in which the Russians were now engaged, and the scientific results of which were freely communicated; and he congratulated the President, Sir Roderick Murchison, on the actual realisation of his anticipations of former years, when Russia and England would be friendly rivals in completing our acquaintance with the geography of the respective boundaries of each in their Eastern possessions.

Ethnological Society, April 26.—Prof. Huxley, F.R.S., in the chair.—Dr. Donovan read a paper on "The importance to the Ethnologist of a careful study of the Characters of the Brain."—Mr. E. B. Tylor then read a communication "On the Philosophy of Religion among the Lower Races of Mankind." Generalising from the lower religions of the world, the author stated the principle on which, in his view, was developed the philosophy of what may be called Natural Religion. Taking the doctrine of spiritual beings as the minimum definition of religion, he described it as *animism*, a term which fits with the theory put forward, that the conception of the soul as recognised by the lower races, is the starting-point of their religious philosophy. Such a soul, combining the ideas of ghost and vital principle, explains the phenomena of life, disease, dreams, visions, &c. This idea is extended to animals and inanimate objects, which are considered to have souls capable of appearing after death or destruction. On the analogy of the body and soul, the actions of nature are explained on the animistic theory as worked or controlled by soul-like spiritual beings. Of these beings an immense number are held to be actually human souls or manes. To such beings are ascribed the phenomena of disease, especially epilepsy and mania. Similar in nature, though different in function, are the spirits of trees, springs, &c. Hence the savage polytheist rises to expanded conceptions of greater deities, as Sun and Moon. At an early period he separates the cause of good from that of evil, and hence Dualism is rooted deeply in the religion of the lower races. The culminating conception of a Supreme Deity is well known to many of the lower races.—The President, Mr. Pusey, Mr. Howorth, and Dr. Hyde Clarke, joined in the discussion on this paper.

N.B.—It should have been stated in the report of the last meeting, that the paper "On the Danish Element in the Population of Cleveland" was written by the Rev. J. C. Atkinson, of Danby.

PARIS

Academy of Sciences, April 25.—M. Chasles presented a note by M. H. Durrande, on surfaces of the fourth order, and a communication from Mr. Spottiswoode concerning a theorem brought before the Academy on the 21st of March last, and of which he now gives the following enunciation:—"Every point of a surface is sextactic in ten of the sections made by the planes of a bundle of which the axis passes through the point."—M. de Saint Venant presented a memoir on the pressure of soils, containing a comparison of his estimates from the rational consideration of the limit of equilibrium, and by the employment of the so-called principle of least resistance of Moseley.—Several papers on subjects connected with physics were read. M. Becquerel communicated some experimental researches by MM. Lucas and Cazin, upon the duration of the electric spark. M. Jamin presented a note by M. A. Trève, on electric currents, containing some curious and interesting experiments on the action of currents in opposite directions, and when crossed in vacuum-tubes. A note by M. Rénou, on the latent heat of ice, deduced from the experiments of Laplace and Lavoisier, was communicated by M. C. Sainte-Claire Deville. The author referred to a note by M. Jamin, in which the correctness of the experiments made by Laplace and Lavoisier was maintained, and stated that the accordance of results obtained by M. Jamin could only be fortuitous, as the thermometers employed by the old experimenters were inaccurate.—M. H. Sainte-Claire Deville presented a note on the formation of liquid drops, by M. Duclaux. The author described experiments with distilled water, and with alcohols of different strengths, and stated that in the formation of drops phenomena of cohesion have but little action. Drops of water are formed much more rapidly in vapour of alcohol than in the air, and yet the amount of alcohol dissolved is very small, and hence the author concluded that the effect is produced only upon a very thin superficial layer of the drop, the tension of which constitutes the resisting power determining the size of the drop. He extended these considerations to the formation of emulsions, and to various liquids in the organism.—A paper on the fixed characteristic notes of the different vowels, by M. R. Kœnig, was presented by M. Regnault. The author discussed the results obtained by MM. Helmholtz and Donders, and gave the following as that of his own investigations into the musical notes of the vowels.

OU	O	A	E	I
(si♭)2	(si♭)3	(si♭)4	(si♭)5	(si♭)6

giving in round numbers of simple vibrations: 450, 900, 1,800, 3,600, 7,200.—Numerous papers relating to astronomical subjects were communicated, and M. Delaunay read a note on the discovery of a new telescopic planet at the Observatory of Marseilles on the 19th April. This is the 110th asteroid of the group between Mars and Jupiter, and M. Delaunay proposes for it the name of *Lydia*. Its position on the 19th April, at $10^h\ 33^m\ 13^s$, mean time at Marseilles, was as follows:—

$$A\,R = 12^h\ 2^m\ 39^s,\ 22.$$
$$D = +6^\circ\ 50',\ 38''.\ 8$$
$$\text{Horary movements} \begin{cases} \text{in right ascension} & -\ 1^s\ 77 \\ \text{in declination} & +\ 2''.\ 20 \end{cases}$$

Magnitude 12 — 13.

M. Faye presented three memoirs, namely: a report on the operations of M. Respighi in spectral observation of the solar protuberances; a note on the recent experiments of M. Wüllner on the spectra of hydrogen, oxygen, and nitrogen, with reference to those of the solar protuberances; and a note on the processes of photographic observation proposed by M. Paschen for the coming transit of Venus.—A letter from Father Secchi on the results of some spectral observations of the sun was also read.—M. Delaunay presented, on the part of M. Flammarion, a reply to the objections raised by M. G. Quesneville to his law of the rotatory movement of the planets.—M. Chapelas presented a note on a luminous meteor of great brilliancy observed at Paris on the night of the 19th of April. This meteor passed from near σ Herculis to the neighbourhood of $\delta\ \epsilon\ \zeta$ Cephei, describing a trajectory from S. to N. of 48°. Its colour was green, and it had a long train. Its disappearance was preceded by three noiseless explosions, accompanied by flashes which illuminated the hills round Paris. Its apparent size was 6 or 7 times that of Jupiter.—The subject of arctic explorations was treated by M. C. Grad, who suggested as an untried route for attempting to reach the North Pole, the passage through the Sea of Kara and the Siberian Ocean.—The chemical papers were the following: Researches upon new platinic derivatives of the phosphorus-bases, by MM. A. Cahours and H. Gall; on the utilisation of the secondary products obtained in the manufacture of chloral, for the preparation of the æthylamines on a large scale, by M. A. W. Hofmann; thermical investigations of iodic acid, by M. A. Ditte, communicated by M. H. Sainte-Claire Deville; and thermical investigations of the states of sulphur, by M. Berthelot, presented by M. Balard.—M. A. Béchamp communicated a memoir on geological "microzymas" of various origin, in which he described the action of different rocks in producing alteration and fermentation of starch-paste, and sugar. He maintained that in all limestones, from the Great Oolite to the most recent Tertiaries, there exist living organisms (for which he has proposed the name of *Microzymas*), of the nature of the molecular granules observed in certain fermentations, and that these are the agents which produce the changes described by him. He stated that pure carbonate of lime has no such action.—M. Milne-Edwards presented a note by M. Jourdain on the mode of action of chloroform, upon the irritability of the stamens of *Mahonia*. Exposure for from 1 to 3 minutes to the vapour of chloroform was said to destroy temporarily the irritability of the stamens; exposure for 10 minutes or a quarter of an hour kills the portion of the plant subjected to it.—A note on the primitive type of the mammalia, by M. A. Roujou was read.—M. C. Robin communicated a note by M. Girard-Teulon on the law of the rotations of the eye-ball in the associated movements of the eyes, in which the author supported the views of Donders, in opposition to those of Helmholtz and Listing, and indicated what, in his opinion, had led the latter writers to a false conclusion.—The Abbé Richard communicated an account of the discovery of a workshop for the manufacture of flint instruments in Palestine.—This workshop is near the village of El-Bire (the ancient Beeroth), about twelve kilometers from Jerusalem; the author found *haches*, scrapers, knives, and saws, the last said by him to be very remarkable.—Besides these, and two papers on medical and surgical subjects, several notes were read of which the titles only are given.

VIENNA

Imperial Academy of Sciences, Feb. 3.—Prof. P. Redtenbacher presented on the part of Prof. H. Will, "An investigation of white mustard seed." In place of the myronate of potash of black mustard seed, the white mustard contains *sinalbine*, decomposable into sugar, a sulphocyanic compound and an acid sulphate. The sulphocyanic compound contains the radical *akrinyle* $C^7 H^7 O$, and when freed from sulphur and treated as nitryle with alkali furnishes ammonia and the salt of an acid $= C^8 H^8 O^3$, which melts at 277° F., and is not identical with any known acid of the same formula. The acid sulphate contains sinapisine, and the author contrasts the products of black and white mustard as follows:—

	Myronate of Potash.		Sugar.		Mustard Oil.		Sulphate of Potash.
1.	$C^{10} H^{18} NS^2 KO^{10}$	$=$	$C^6 H^{12} O^6$	$+$	$C^4 H^5 NS$	$+$	$SO^4 K H$
	Sinalbine.		Sugar.		Sulphocyanide of akrinyle.		Sulphate of sinapisine.
2.	$C^{30} H^{44} N^2 S^2 O^{16}$	$=$	$C^6 H^{12} O^6$	$+$	$C^8 H^7 NOS$	$+$	$SO^4 (C^{16} H^{14} NO^5) H$

February 10.—Mr. Joseph Rauter forwarded a memoir on the "Developmental history of some of the hairy structures of plants belonging to various families of *Dicotyledons*." He noticed that in some cases the hairs are simple products of the epidermal cells; whilst in others, although the first rudiment of the hair takes its origin from an epidermal cell, at a later period the subjacent parenchyma and the neighbouring epidermal cells take part in its structure; and in others, again—such as the spines and glandular hairs of roses—the first rudiment of the structure springs from the subcuticular tissue. As examples of the first mode of development, he cites the woolly hairs of *Ribes*, *Rosa*, &c., the stellate hairs of *Hieracium pilosella*, and the glandular hairs of *Hieracium*, *Azalea*, &c.; of the second, the stings of the nettle, the clinging hairs of the hop, and some other forms.—Dr. Boué presented the first portion of his mineralogico-geognostic observations made during his travels in Turkey in Europe, and relating to North Albania, Bosnia, Hergezowina, and Turkish Croatia.—Prof. J. Redtenbacher communicated the results of an investigation of some Austrian hydraulic magnesian lime which had been made in his laboratory by M. P. G. Hauenschild. The material contained about sixty per cent. of carbonate of lime, and thirty per cent. of carbonate of magnesia; when burnt at about 752° F. it furnished an excellent hydraulic cement.—Prof. Hlasivetz made a preliminary communication "Upon a new acid from grape sugar." He referred to his discovery of lactonic acid by the treatment of sugar of milk with bromine, and indicated that the only difference between the two bodies consists in the presence of one more atom of oxygen in the acid. A similar acid was produced by treating other sugars with bromine, but the hydrobromic acid formed in the reaction prevented its separation. The author induced M. Habermann to treat grape sugar with chlorine instead of bromine, and he has obtained the expected acid, having the formula $C^6H^{12}O^7$.—Dr. S. L. Schenk communicated a memoir "On the distribution of gluten in the wheat-grain," and Prof. Lang some "Crystallographic-optical determinations" relating to thirteen substances, chiefly of organic origin.

Imperial Geological Institution, April 5.—Th. Fuchs on the fossil shells of the Congeria-beds from Radmanest, near Lugas (Banat). A comparatively large number of species (48, 32 of them hitherto unknown in Austria), but of small size, characterise this fauna, and correspond to the fauna of the so-called Upper Steppen-Kalk (limestone of Odessa) in southern Russia. The small amygdaloid *Congeria simplex*, recently described by Barbot de Marny, which alone forms whole beds of the Odessa-limestone, is also found abundantly in Radmanest. Among the small Cardiadæ of the Odessa-limestone, some species differ from the usual type of the genus by possessing a sinuated pallial line. Very interesting is therefore the discovery of a new species of *Congeria* at Radmanest, which differs in the same way from the generic type of Congeria.—Ch. v. Hauer on the coking of brown coal. A series of experiments with the brown coal from Fohnsdorf (Styria) gave very satisfactory results. Cokes were obtained with a heating power equal to that of the cokes of good black coal; the proportion of sulphur was essentially diminished, and the cokes are firm enough to support the pressure of a high furnace. V. Hauer thinks that, mixed with cokes of black coal, they would be applicable to the smelting of iron, a problem the solution of which would be of the utmost importance for the iron manufacturers in the Alpine iron districts.

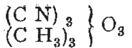
April 23.—Ferd. Baron v. Andrian on the Volcanic Rocks of the Bosphorus. An accurate investigation of the geological relations, the mineralogical characters, and the chemical constitution of these rocks, which border the mouth of the Bosphorus to the Black Sea, served to distinguish a series of different varieties which in part are almost perfectly identical with the trachytic rocks of Hungary and Transylvania. In both countries generally three types may be distinguished, viz.: green andesites and dacites; black augit-andesites, and rhyalithes.—Prof. Ch. Zittel from Munich contributed some remarks on the tithonic strata. His important memoir on the fossils of the Stramberg limestone will be followed within a few weeks by another on the fossils of the cliff limestone (Klippenkalk) of the environs of Rogoznik and Csarsztyn (Galicia), and the tithonic cephalopod-limestone of Southern Tyrol and Italy. His studies have brought him to the conclusion that an exact line of demarcation does not exist between the Jurassic and the Cretaceous formation. Prof. Ch. Hoffmann of Pesth announced the discovery of Triassic fossils in the older Dolomite—and limestone-rocks of the environs of Ofen, which had formerly been thought to belong to the Rhaetic series. — M. Ch. Paul has examined the Lignite-beds of western Slavonia. In a thickness of more than 6 feet they are to be found along a line of 15 German miles in length, they belong to the upper Miocene formation (Congeria or fresh-water beds of the Vienna Basin), which contains many fossils, among them chiefly to be noticed a very large new species of Unio.—Dr. Em. Tietze, of Breslau, spoke about the fossils of the carboniferous limestone of Silesia. Nearly two hundred different species have been found therein, they will be described in a special memoir.—M. Fr. Posepny on the lead-mines of Raihl in Carinthia. The ores are imbedded in irregular masses in a stratified limestone of Triassic age. They form neither layers nor true veins, but are dependent on dislocations in the limestone-strata, and the over-lying schists.

BERLIN

German Chemical Society, March 28.—M. G. Krämer has investigated the products accompanying the formation of chloral from alcohol. Besides chloride of ethyl already recognised by Hofmann, both chloride of ethylene, and chloride of ethylidene, as also the monochlorinated substitution compound of both have been isolated. Chlorinated chloride of ethylene $C_2 H_3 Cl_3$ boils at 115° and yields with potash $C_2 H_2 Cl_2$ boiling at 37° and transforming itself into a solid polymeric modification, Chloride of ethylidene and ammonia produce collidene. Professor Hofmann, in continuance of former researches, has transformed methylated and amylated sulpho-ureas into trimethylated and triamylated melamines by the action of oxide of mercury. This reaction however is but secondary, the first products being substituted (neutral) cyanamides, which by repeated evaporisation become suddenly transformed into alcaline melamides. The ethylic, and the phenylic sulpho-ureas behave in the same manner. The transformation consists in three molecules of cyanamide uniting into one of melamine—

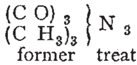
$$3\,C\,H\,(C_2\,H_5)\,N = C_3\,H_3\,(C_2\,H_5)_3\,N_3$$

The same chemist, in conjunction with Dr. Olshausen, publishes researches on polymeric modifications of cyanetholine, and its homologues. These researches are connected with the foregoing paper by the following consideration. A certain analogy between ethylcyanamide $C\,N\,(C_2\,H_5)\,H\,N$ and cyanetholine—$C\,N\,(C_2\,H_5)\,O$ allows us to predict that the latter will treble, in the same way that the former does. This has been found to be the case. By passing chloride of cyanogen into methylate of sodium, the cyanetholine of the methylic series (an oil) forms at the same time, with crystals of the formula—



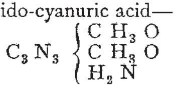
$$\left.\begin{array}{l}(C\,N)_3\\(C\,H_3)_3\end{array}\right\}O_3$$

cyanurate of methyl. These crystals fuse at 134° but are transformed by distillation into the isomeric compound—



$$\left.\begin{array}{l}(C\,O)_3\\(C\,H_3)_3\end{array}\right\}N_3$$

fusing at 175°. The former treated with potash yields cyanuric acid, and methylic alcohol; the latter carbonic acid and methylamine. The former, treated with ammonia, forms the dimethylic ether of amido-cyanuric acid—



$$C_3\,N_3\left\{\begin{array}{l}C\,H_3\,O\\C\,H_3\,O\\H_2\,N\end{array}\right.$$

The same compound is formed (together with cyanurate of methyl) when chloride of cyanogen is passed into methylate of sodium, and may be separated from the cyanurate, by the action of ether, in which it is insoluble. The circumstance that the corresponding ethyl-compound dissolves in ether, renders the investigation of the transformation of cyanetholine more difficult. Analogous results have been obtained when chloride of cyanogen was passed into amylate and phenylate of sodium.

Professor Rammelsberg, in a paper on the phosphates of thallium, stated that isomorphism exists between

1. $H\,Tl_2\,PO_4\,H_2\,O$ and $H_2\,Na\,PO_4\,H_2\,O$
2. $H_2\,Tl\,PO_4$ and $H\,(NH_4)_2\,PO_4$
3. $H\,Tl_2\,PO_4$ and $H_2\,(N\,H_4)\,PO_4$

This he considers as the first proof of the isomorphism of hydrogen with monatomic metals. The same is stated of a phosphoborate of magnesium found in the saltlayers of Lüneburg, and analysed by Nöllner, who gives it the formula $Mg\,B_2\,O_4.\ 2\,H\,Mg\,PO_4$, De Koninck and Marquardt have investigated Bryonicine, one of the two bases contained in the roots of *Bryonia dioica*, and give it the formula $C_{10}\,H_7\,N\,O_2$. P. Marquardt described polybromides of tetraethyl ammonium. Dr. Coninck described modifications of Bunsen's sucking apparatus for filtering, and of Mitscherlich's potash bulbs for combustion. M. Ballo recommends the preparation of binitronaphthol by oxydising naphthylamin with nitric acid. By the action of monobrominated naphthalin on rosaniline, he has produced a violet colouring matter, not yet analysed. W. Doer has prepared azonaphthaline by heating nitronaphthaline with zinc powder. F. Rochleder has found four new colouring substances in madder, $C_{14}\,H_8\,O_4$ isalizarine; and its homologue, a very similar substance, $C_{15}\,H_{10}, O_4$; a third called hydrisalizarin, $C_{28}\,H_{18}\,O_8$, and a fourth, homologous with the foregoing, $C_{29}\,H_{20}\,O_8$. The proportions in which these substances occur in madder are minute. N. Bunge on electrolysis communicates that nitrophenate of potassium yields to the anode nitrophenol and oxygen. Thiacetic acid and thiobenzoic acid yield bisulphide of acetyle, and bisulphide of benzoyl. But sulphocyanide of potassium, instead of yielding bisulphide of cyanogen, gives pseudo-sulphocyanogen. L. Henry has proved the identity of tribromhydrine of glycerine with the tribromide of allyle, from which it has hitherto been considered to differ. N. Lubarin, in submitting chloraluric acid to a renewed investigation, has arrived at the conclusion that it is impure parabanic acid mixed with chloride of ammonium. A. Ladenburg has found that, in support of Dr. Wanklyn's opinion, acetic ether perfectly free from water is not attacked by sodium below 100° C., and that in this reaction no evolution of gas takes place. For decomposing the water and alcohol generally contained in what is called pure acetic ether, the chlorides of silicium or of phosphorus were employed. Lastly, M. Vogel reported on Camuzet's experiments on gun-cotton, which differ so entirely from everything hitherto asserted, that they require confirmation. According to Camuzet, water dissolves the greater part of gun-cotton, separating at the same time the remaining part into a flocculent mass (the explosive ingredient of gun-cotton), and a granular non-explosive powder, which falls to the bottom of the vessel.

DIARY

THURSDAY, MAY 5

ROYAL SOCIETY, at 8.30.—On the Pre-Carboniferous Flora of North-Eastern America, and more especially on that of the Erian (Devonian) Period (Bakerian Lecture): Principal Dawson, F.R.S.

SOCIETY OF ANTIQUARIES, at 8.30.—On the Date of the Discovery of the American Continent, by John and Sebastian Cabot: R. H. Major, F.S.A.

LINNEAN SOCIETY, at 8. CHEMICAL SOCIETY, at 8.

ROYAL INSTITUTION, at 3.—Electricity: Prof. Tyndall.

FRIDAY, MAY 6.

ROYAL INSTITUTION, at 8.—Star-grouping; star-drift; star-mist: R. A. Proctor.

SATURDAY, MAY 7.

ROYAL INSTITUTION, at 3.—Comets: Prof. Grant.

MONDAY, MAY 9.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.

LONDON INSTITUTION, at 4.—Botany: Prof. Bentley.

TUESDAY, MAY 10.

ETHNOLOGICAL SOCIETY, at 8.30.—(Special meeting at the Museum of Practical Geology). Opening address: Prof. Huxley. On the Influence of the Norman Conquest in the Ethnology of Britain: Rev. Dr. Nicholas.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Discussion on the Strength of Iron and Steel. Recent Improvements in Regenerative Hot Blast Stoves, for Blast Furnances: E. A. Cowper.

ROYAL INSTITUTION, at 3.—On the Principles of Moral and Political Philosophy: Prof. Blackie.

PHOTOGRAPHIC SOCIETY, at 8.

WEDNESDAY, MAY 11.

GEOLOGICAL SOCIETY, at 8.

ROYAL MICROSCOPICAL SOCIETY, at 8.—On a new form of Binocular and Stereoscopic Microscope: Mr. Samuel Holmes.

ARCHÆOLOGICAL ASSOCIATION, at 8.

THURSDAY, MAY 12.

ROYAL INSTITUTION, at 3.—Electricity: Prof. Tyndall.

ZOOLOGICAL SOCIETY, at 8.30.—Notes on some points in the anatomy of certain Kingfishers: Dr. Cunningham.—On the taxonomic characters afforded by the muscular sheath of the œsophagus in Sauropsida and other Vertebrates: Mr. George Gulliver.—Notes on the myology of *Platydactylus Japonicus*: Mr. Alfred Sanders.—On the Hirundinidæ of the Ethiopian region: Mr. R. B. Sharpe.

LONDON MATHEMATICAL SOCIETY, at 8.—On the Mechanical description of a nodal bicircular Quartic: Prof. Cayley.—Concerning the ovals of Des Cartes: Mr. S. Roberts.

BOOKS RECEIVED.

ENGLISH.—Choice and Chance: Rev. W. A. Whitworth (Deighton and Bell).—Blanford's Natural History of Abyssinia (Macmillan and Co.).—The Lifted and Subsided Rocks of America, by Catlin (Trübner and Co.).—The Yosemite Guide-book: J. D. Whitney.

FOREIGN (through Williams and Norgate).—Ornithologie Nordost Afrikas Th. von. Heuglin: Elektrische Untersuchungen, achte Abhandlungen über die thermoelektrischen Eigenschaften des Topases: W. G. Hanke.—Bestimmung der Sonnenparallaxe durch Venus-vorübergange vor der Sonnenscheibe: P. A. Hansen.—La psychologie anglaise contemporaine: T. H. Ribot.—Das Verhalten der Eigenwärme in Krankheiten: D. C. A. Wunderlich.—Verhandlungen der k. k. Zoologisch-botanischer Gesellschaft in Wien 1869.—Berichte über die Vorhandlungen Ost Afrika.

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ERRATUM.—By an error of the press, Prof. Duncan's Table of Madreporaria dredged up in the 'Porcupine' Expedition (No. 26, p. 660), was designated "Madreporaria of the Red Sea," instead of the "Deep Sea."

The INDEX and CONTENTS for Vol. I., will be published with an early number.